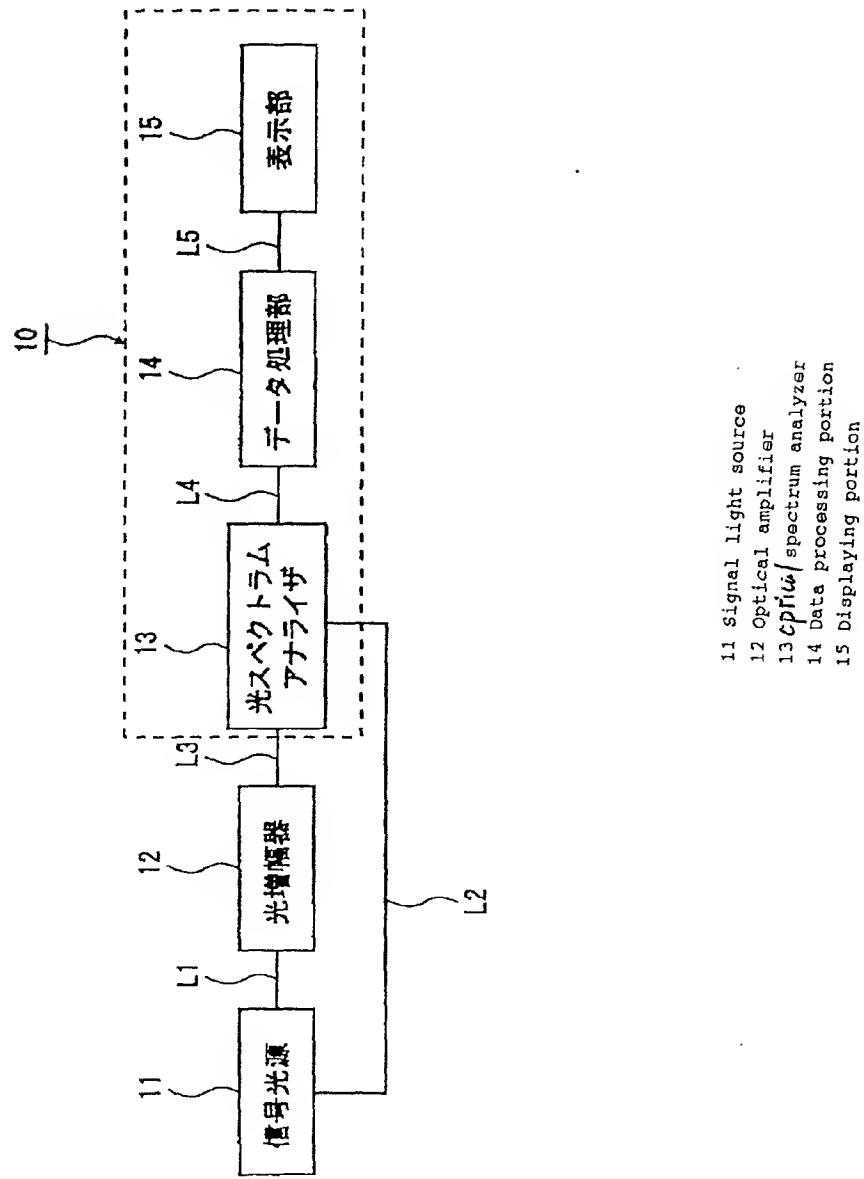


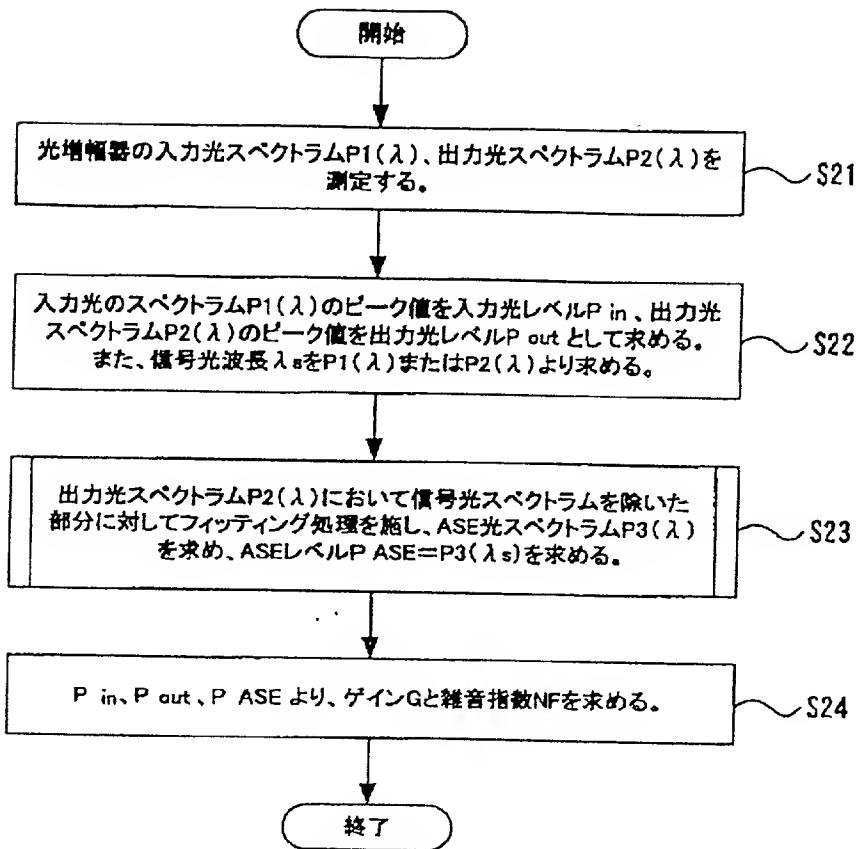
NOISE FIGURE-MEASURING DEVICE AND NOISE
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Fig. 1



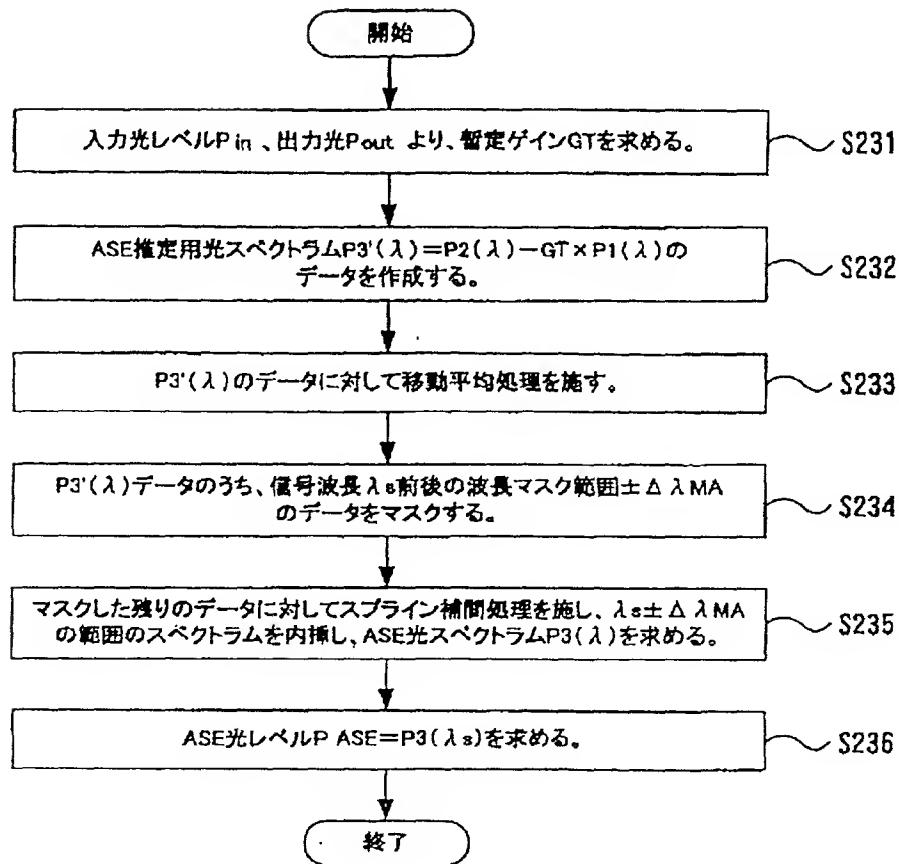
- 11 Signal light source
- 12 Optical amplifier
- 13 Cpmeter / spectrum analyzer
- 14 Data processing portion
- 15 Displaying portion

Fig. 2.



- S21: Measure input light spectrum $P_1(\lambda)$ and output light spectrum $P_2(\lambda)$.
- S22: Calculate peak value of input light spectrum $P_1(\lambda)$ as an input light level P_{in} , and peak value of output light spectrum $P_2(\lambda)$ as an output light level P_{out} . Calculate signal light wavelength λ_s based on $P_1(\lambda)$ or $P_2(\lambda)$.
- S23: Perform fitting process for portion excluding signal light spectrum in terms of output light spectrum $P_2(\lambda)$ data to prepare an ASE spectrum $P_3(\lambda)$ to calculate ASE light level $P_{ASE} = P_3(\lambda_s)$.
- S24: Calculate gain G and noise figure NF based on P_{in} , P_{out} , and P_{ASE} .

Fig. 3



- S231: Calculate provisional gain GT based on input light level Pin and output light level Pout.
- S232: Prepare data of light spectrum for assuming ASE $P3'(\lambda) = P2(\lambda) - GT \times P1(\lambda)$.
- S233: Perform moving average process for the data of $P3'(\lambda)$.
- S234: Mask data within a wavelength mask range of $\pm \Delta\lambda_{MA}$ of $P3'(\lambda)$ data before and after the signal wavelength λ_s .
- S235: Perform spline interpolation process for the remaining data after masking. Interpolate spectrum within range of $\lambda_s \pm \Delta\lambda_{MA}$. Calculate ASE light spectrum $P3(\lambda)$.
- S236: Calculate ASE light level $P_{ASE} = P3(\lambda_s)$.

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Fig. 4A

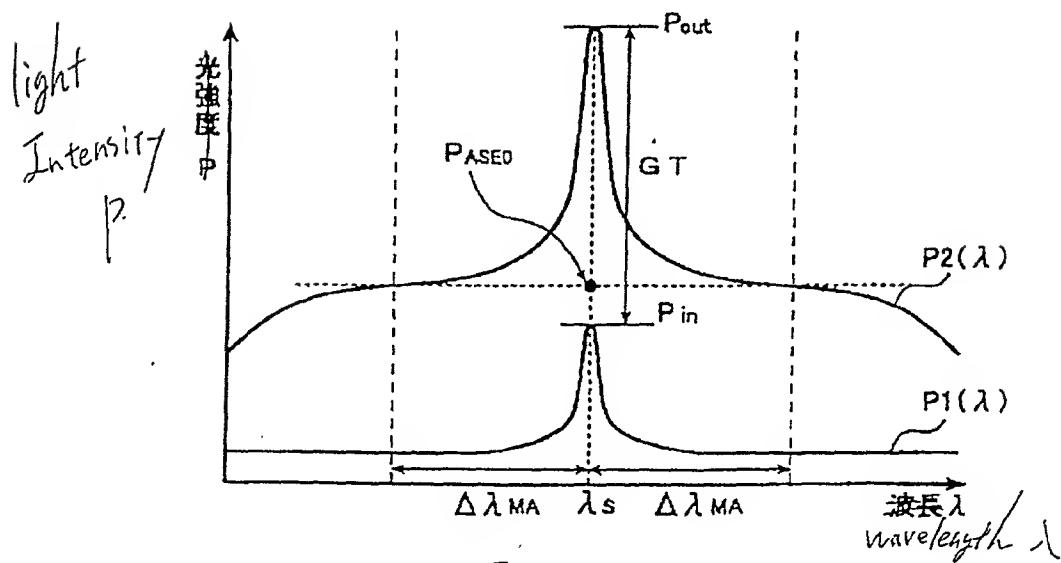


Fig. 4B

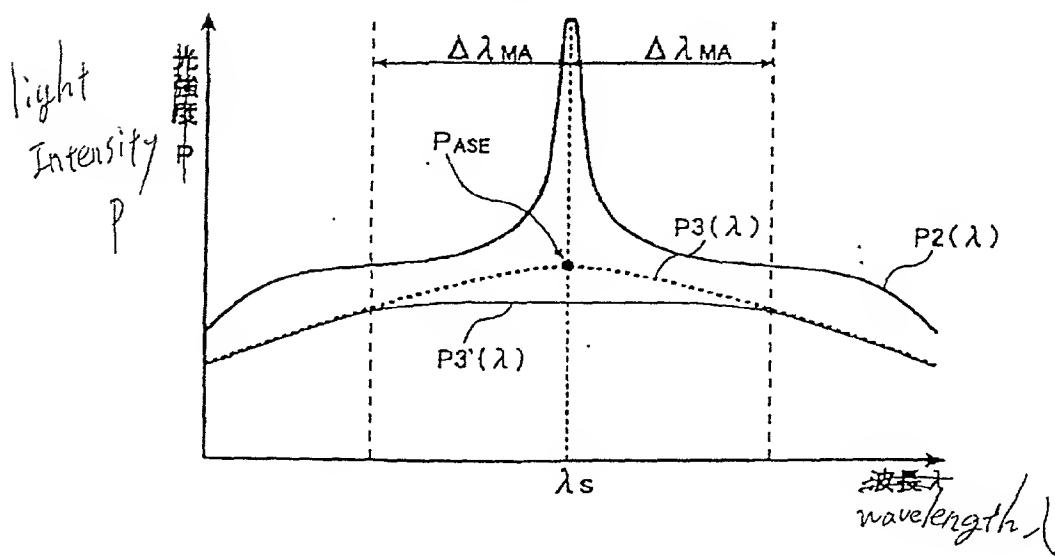
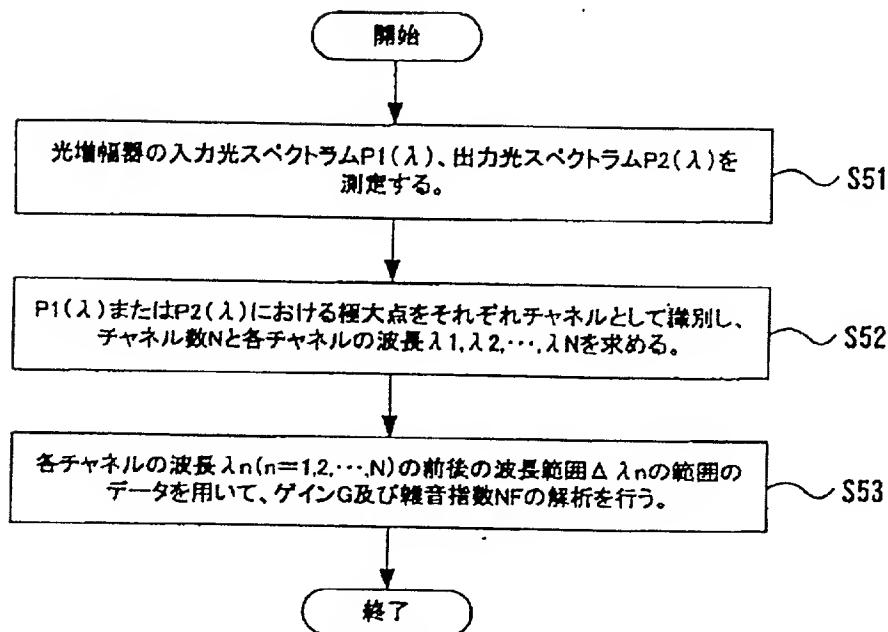
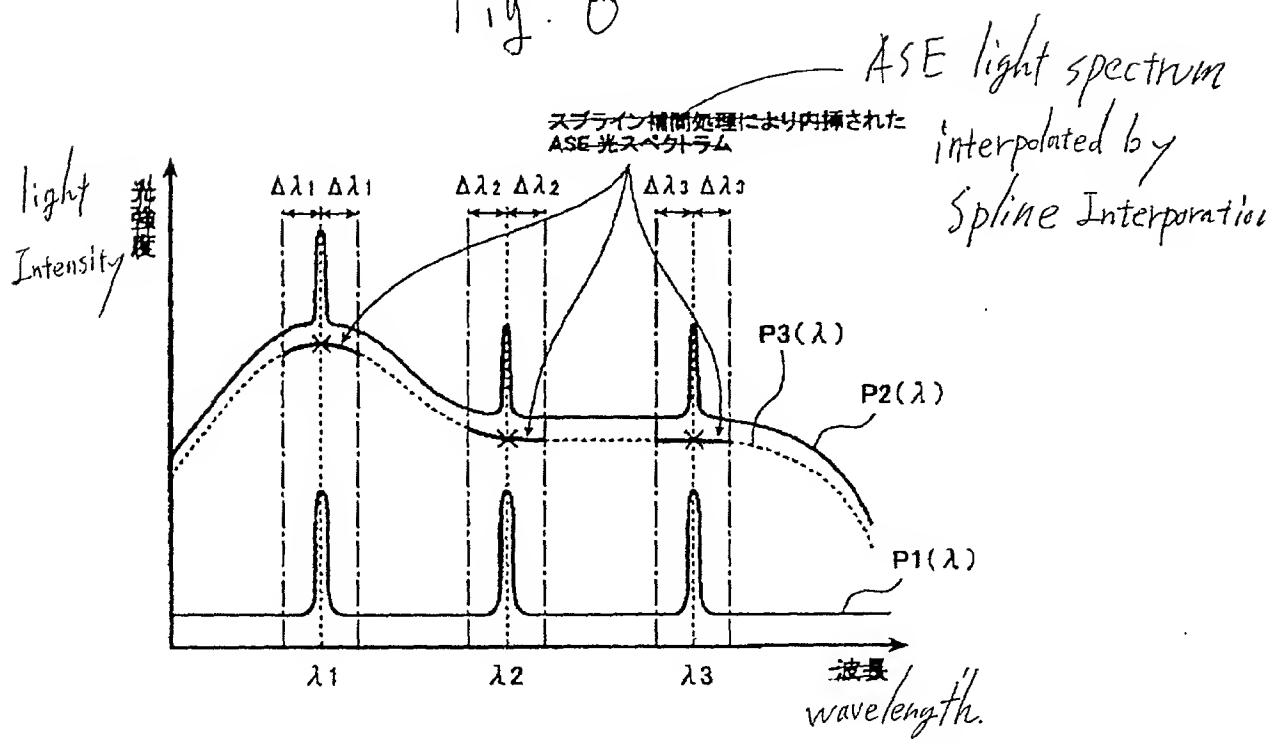


Fig. 5



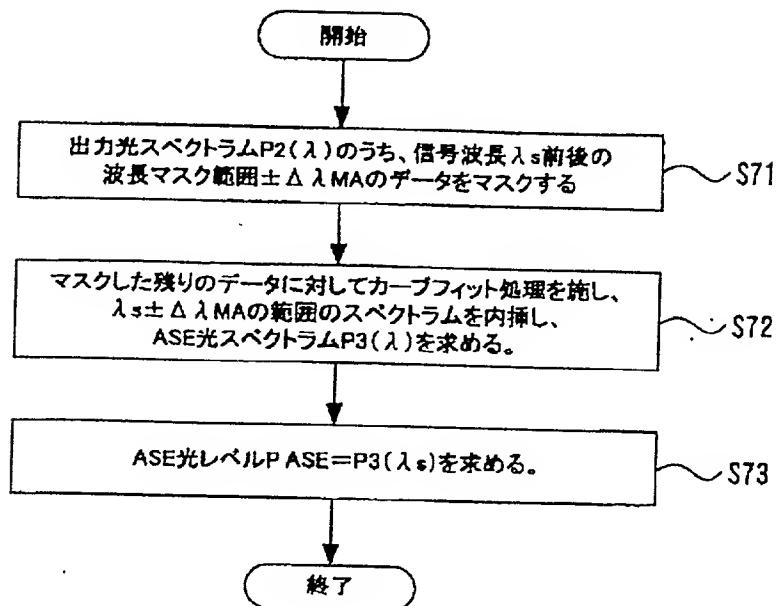
- S51: Measure input light spectrum $P_1(\lambda)$ and output light spectrum $P_2(\lambda)$ of optical amplifier.
- S52: Recognize peak points in $P_1(\lambda)$ or $P_2(\lambda)$ as channels, respectively. Determine the number of channels and the wavelengths $\lambda_1, \lambda_2, \dots, \lambda_N$ of respective channels.
- S53: Analyze gains G and noise figure's NF by data within the range of $\Delta\lambda_n$ before and after the wavelength λ_n ($n = 1, 2, \dots, N$) of each channel.

Fig. 6



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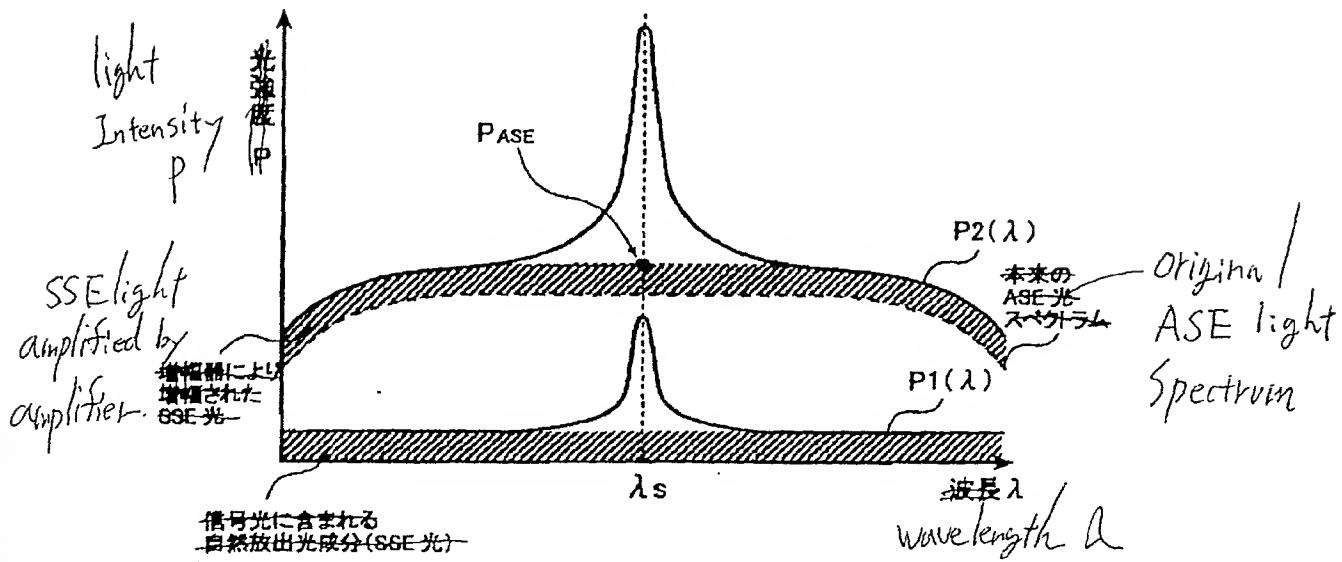
Fig. 7



- S71: Of the output light spectrum $P_2(\lambda)$, mask data within wavelength mask range of $\pm \Delta\lambda_{MA}$ before and after the signal wavelength λ_s .
- S72: Perform curve-fit process for the remaining data after masking. Interpolate a spectrum within the range of $\lambda_s \pm \Delta\lambda_{MA}$. Determine ASE light spectrum $P_3(\lambda)$.
- S73: Determine ASE light level $P_{ASE} = P_3(\lambda_s)$.

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Fig. 8 A



Source Spontaneous.
emission component
(SSE light) contained in Fig. 8B
Signal light

0083009-112801

